

Patent
USA.229**Amendment to the specification:****Please replace the paragraph beginning on page 4 at line 4 with the following:**

The differences mentioned above are significant and create a number of problems to be resolved. For instance, the amount of material deposited in SDM techniques, both in volume and in mass, can be so substantial that it is generally considered impractical to mount a reservoir directly on the ink jet print head to hold all of the material. Thus, it is typical in most SDM systems to provide a large reservoir at a remote location from the print head that is in communication with ~~the ink~~ the ink jet print head via a material delivery system having a flexible umbilical cord. However, the large container and umbilical cord must be heated to cause at least some of the build material to become or remain flowable so that the material can flow to the dispensing device. Undesirably, start up times are longer for SDM techniques using ink jet print heads than in two-dimensional printing with ink jet print heads due to the length of time necessary to initially heat the solidified material in the large remote reservoir to its flowable state. In addition, a significant amount of energy is required to maintain the large quantity of material in the flowable state in the reservoir and in the delivery system during the build process. This undesirably generates a significant amount of heat in the build environment.

Please replace the paragraph beginning on page 18 at line 20 with the following:

Now referring to FIG. 3, a diagrammatic cross-sectional view is shown of the dispensing device 14. The dispensing device 14 is provided with a receptacle 22 that is in communication with the hopper 16 via a passageway or capillary valve 24. The receptacle contains a volume of build material in a flowable state as identified by numeral 30. Preferably, the passageway is a capillary valve having an effective capillary force that is greater than the capillary force of the discharge orifice 27. Typically the capillary force of most ink jet print heads is between about 3 to 9 inches of H₂O. Thus, it is desirable to select a porous material for the capillary valve 24 having an effective capillary force greater than about 9 inches of H₂O. Satisfactory results can be

achieved using metal mesh filters having an effective capillary force of between about 25 to 60 inches of H₂O. With sub-atmospheric pressure being applied to the receptacle 22, the flowable build material 32 is drawn through the capillary valve or passage 24 and into the receptacle 22. Shown in FIG. 3 the sub-atmospheric pressure is applied to the volume of material in the receptacle 22 via a vacuum line connection 28. Alternatively the receptacle may comprise a generally sealed membrane, or the like, and the sub-atmospheric pressure can be established by providing a biasing spring inside the membrane, if desired. Generally the sub-atmospheric pressure is needed to prevent the flowable build material 30 in the reservoir 30 or receptacle 22 from draining through the discharge orifice 27 when the ink jet print head is not in use. The capillary valve shown in FIG. 3 is conceptually similar to that as disclosed in U.S. Pat. No. 5,280,300 to Fong et al. wherein the capillary valve is used in connection with refilling an aqueous ink solution into an ink jet cartridge.

Please replace the paragraph beginning on page 20 at line 10 with the following:

For example, in one embodiment a hopper may be dedicated to deliver a build material that is dispensed exclusively for building the three-dimensional object 20 while other hoppers may be dedicated to delivering a ~~build~~ support material to be dispensed exclusively for forming a support structure for the three-dimensional object. Alternatively, there could be more than one dispensing device 14, i.e. ink jet print head, where one could be dedicated to exclusively dispense build material to form the three-dimensional object, and another could be dedicated to exclusively dispense the support material to form a support structure for the three-dimensional object, as needed.